

RI/FS Quarterly Update

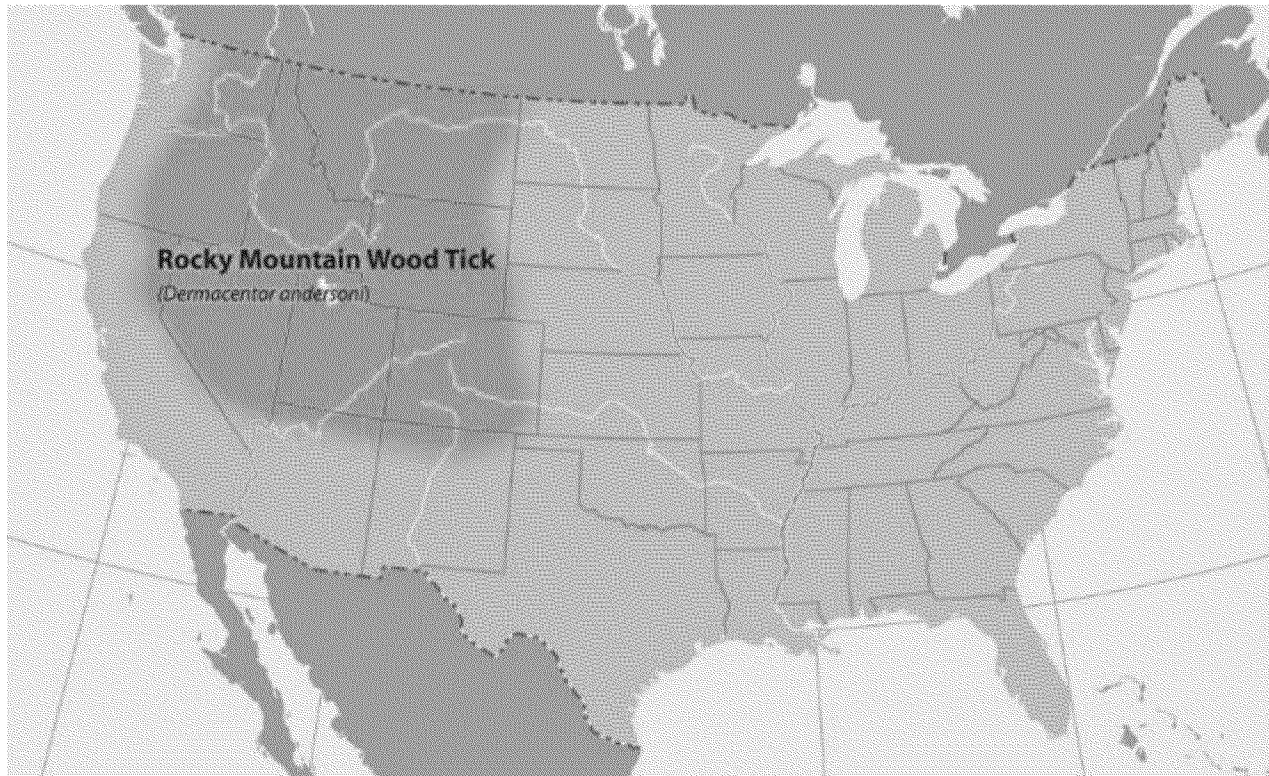


May 23, 2017

Safety Moment

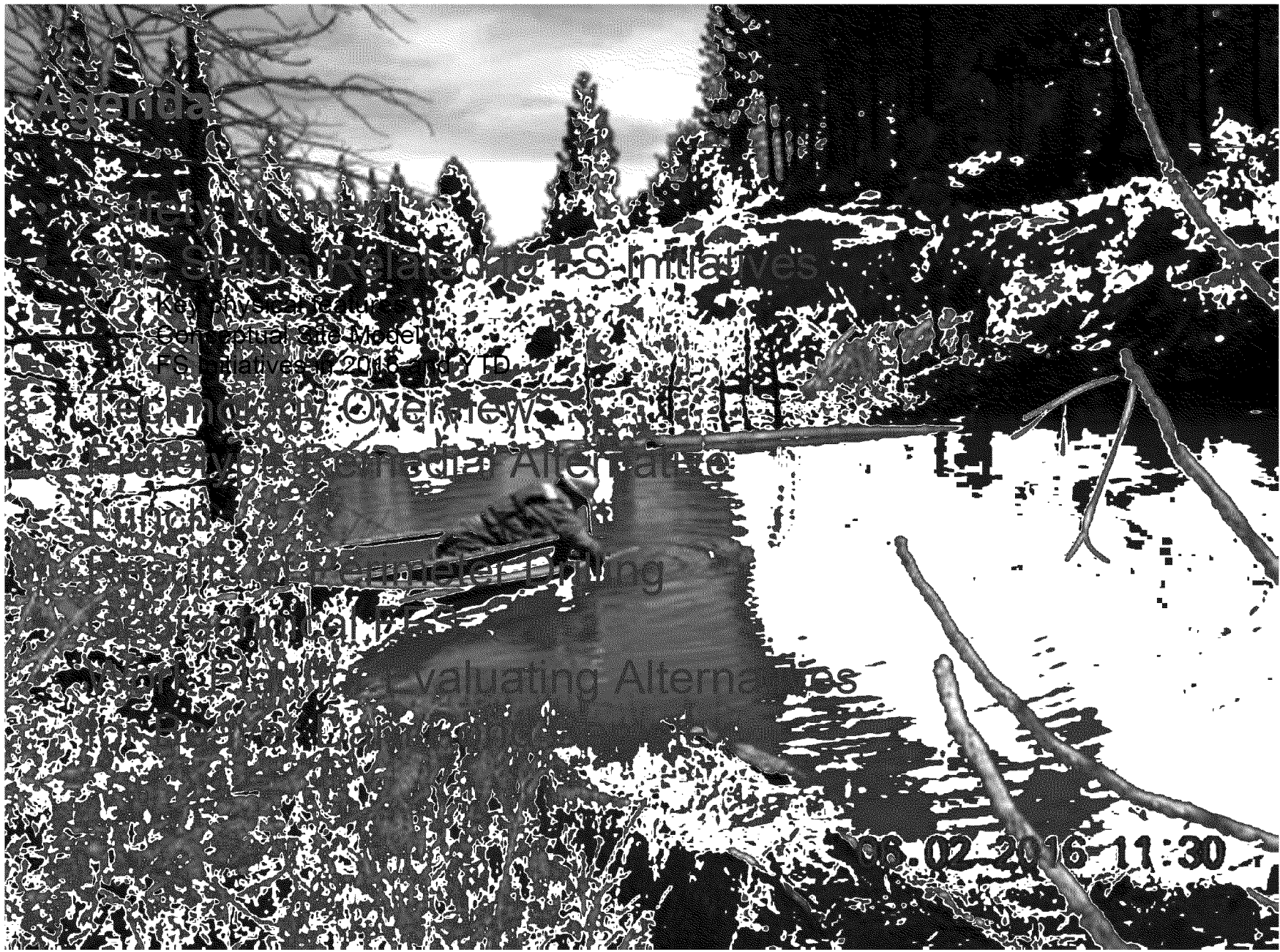


Field Season means *Dermacentor andersoni*



Responsible for Rocky Mountain Spotted
Fever

- Avoid brushy areas and tall grass
- Walk in center of trails
- Use Repellent with DEET (20% or more)
- Use products with permethrin on clothing (0.5%)
- Light colored clothing
- Routine tick checks
- Tape ankles and wrists in areas with high concentrations of ticks
- Tumble dry clothing (non-washed) in dryer on high heat for 10 minutes to kill ticks
- Wash clothes in hot water to kill ticks



Agenda

Forest Stewardship Plan (FSP) Initiatives

- Riparian Zone
- Seasonal Use Model
- FSP Initiatives 2015-2020

Technical Overview

Alternative Management Alternatives

- Silviculture
- Streambed Drilling
- Forest Management

Evaluating Alternatives

- Environmental Impacts
- Economic Impacts

- Social Impacts
- Cultural Impacts

- Cumulative Impacts
- Mitigation Measures

- Monitoring and Evaluation
- Reporting and Transparency

- Stakeholder Engagement
- Adaptive Management

- Conclusion
- Next Steps

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Key Physical Features

- Approximately 656 Acres “On Property”

- Three Study Areas

- Mine Waste Deposits

• Over 100,000 tons of waste material, including mineralized rock

- Pit

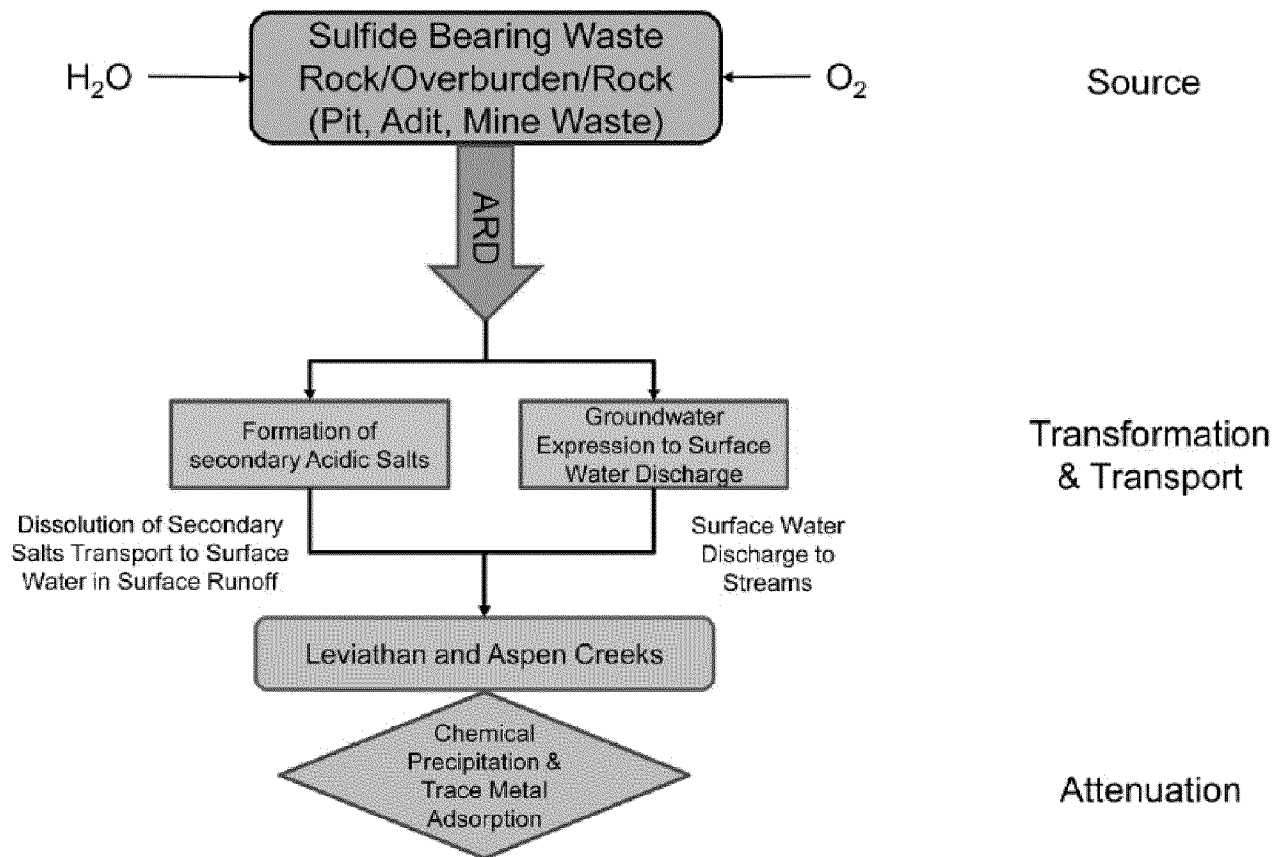
• Approximately 40 acres

• Floor elevation at 7,075 feet (approx. 20 feet below rim)

• Floor is 50 to 100 feet below rim

- Historical Landslides

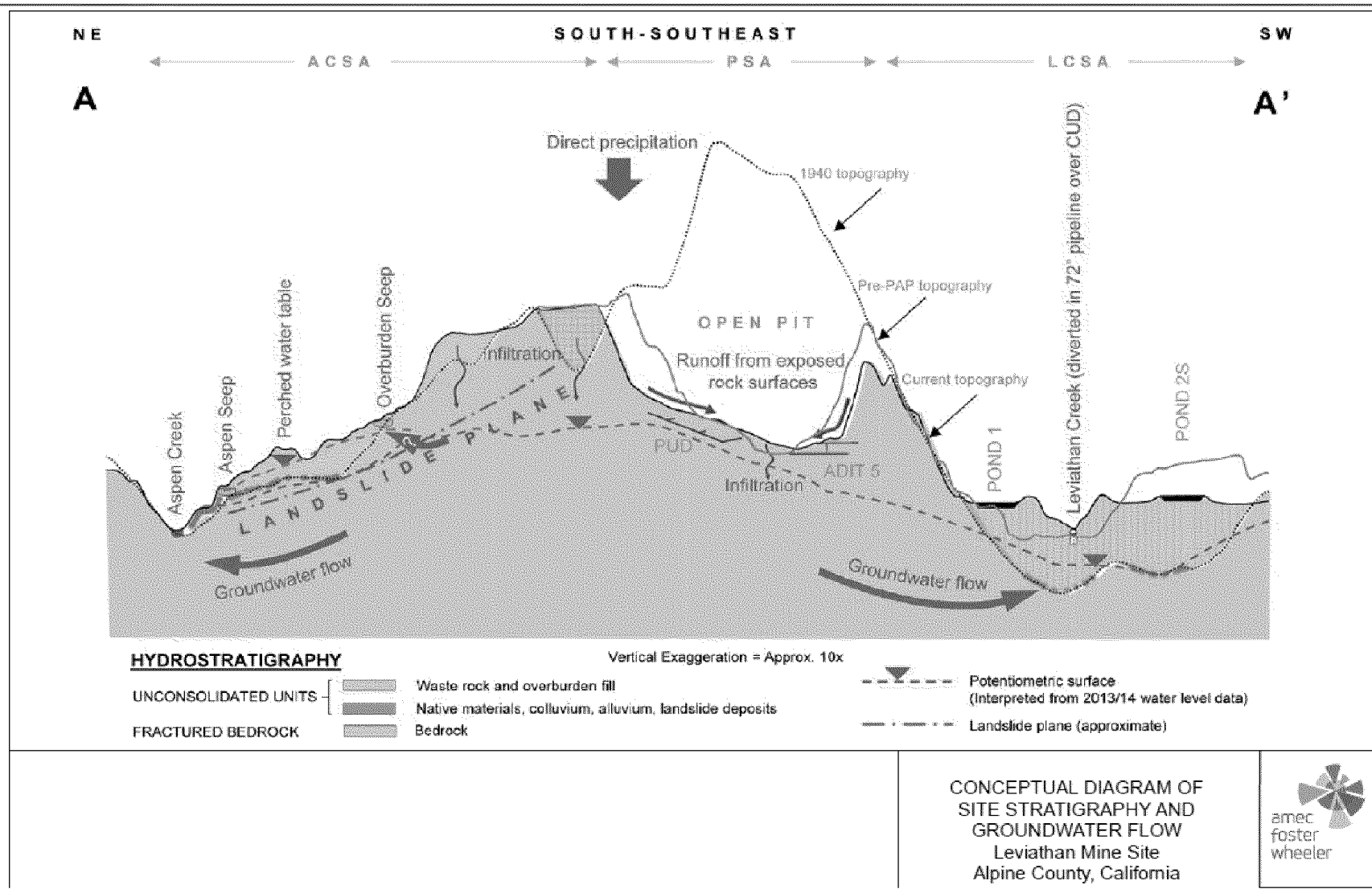
Conceptual Site Model and Sources



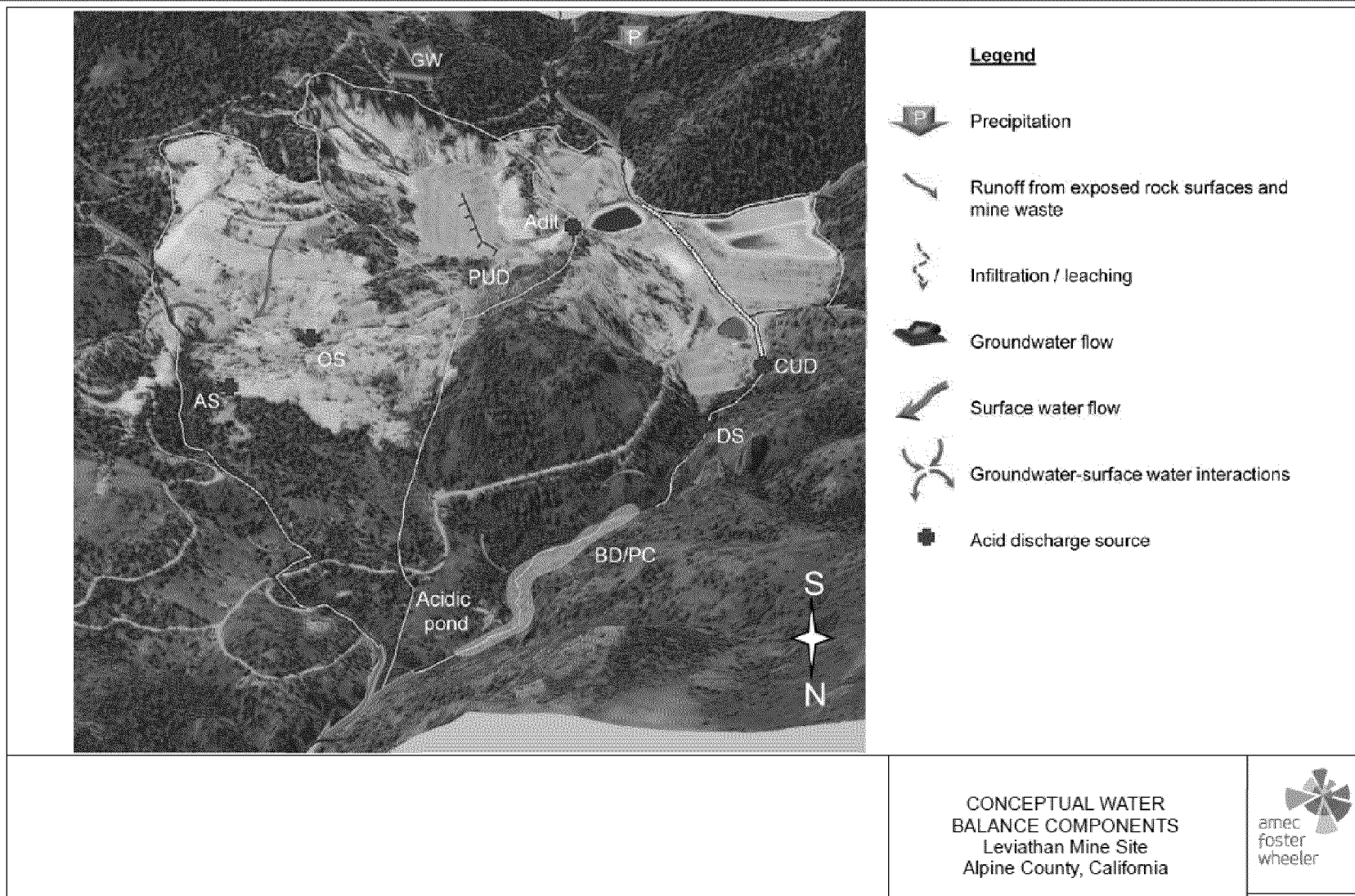
GEOCHEMICAL PROCESS MODEL
Leviathan Mine Site
Alpine County, California



Conceptual Site Model and Sources cont.



Conceptual Site Model and Sources cont.



FS Progress in 2016 and YTD

- **Ongoing Operations Assessments and Experience with HDS Plant and Aspen Seep Bioreactor**
- **Interim Combined Treatment (ICT) Treatability Study (ongoing)**
- **Revegetation Focused Feasibility Study (ongoing)**
- **Geotechnical/Landslide Evaluations (ongoing)**
- **Sludge Disposal Alternative Assessment**
- **Secondary Water Treatment Alternative Assessment**
- **Aspen Seep Conveyance Alternative Evaluation (ongoing)**
- **Groundwater / Surface Water Interaction Assessments**
- **Energy Consumption and Alternative Power Supply Study**
- **Downgradient Impoundment Alternative Evaluation**
- **Beaver Pond Complex Impounded Water and Sediment Evaluations (ongoing)**
- **Offsite Treatment Alternative Evaluation**

Initial Screening of Remedial Alternatives

Section II.B of the SOW states that “a phased approach for evaluation of alternatives may be required for certain facilities, including an initial screening of alternatives to reduce the number of potential remedies for the final detailed evaluation.”

Technology Overview

Medium	General Response Actions	Technology Types	Process Options	Further Screening
Aqueous	No action			Y
	Institutional controls	Access restrictions	Fence, signage	Y
		Land and water use controls	Zoning, restrictions on groundwater and surface water use, federal land resource planning	Y
		Proprietary controls	Deed restrictions, covenants, orders, easement	Y
		Information devices	Deed notices, public information programs, mapping/cataloging	Y
		Technical impracticability	Regulatory waiver	Y
	Monitored natural attenuation	Long-term monitoring	Dilution	Y
			Chemical reactions	
			Sorption	
	Containment		Monitoring wells, surface water sampling, weirs	Y
		Diversion structures	Stream diversion, concrete channels, culverts	Y
		Cut-off Structures	Slurry wall, sheet piling, liners, grout injection	Y
			Interceptor drains and French drains	Y
		Adit 5 plug	Bulkheads – concrete, steel, flow-through	N
			Grout injection	N
		Lined ponds	Expand existing, raise berms, construct new	Y
		Enhanced evaporation	Spray/mist	Y
		Check dams	Flood mitigation, sediment retention	Y
	Ex situ treatment	Anoxic limestone drains	Post-treatment polishing, source water pretreatment	Y
		On-property physical/chemical treatment	HDS, ion exchange, Membrane, neutralization	Y
		Off-property physical/chemical treatment	HDS, ion exchange, membrane, neutralization	N
	In situ Treatment	Chemical injection	Oxidation/reduction, neutralization	N
		Permeable reactive barriers	Oxidation/reduction, adsorption, neutralization	Y
		Engineered wetlands	Up flow, down flow, cross-flow	Y
		Biochemical reactors	Neutralization, oxidation/reduction, precipitation	Y

Technology Overview cont.

Medium	General Response Actions	Technology Types	Process Options	Further Screening
Solid	No Action			Y
	Institutional Controls	Access restrictions	Fence, signage	Y
		Land-use controls (LUCs)	Zoning, restrictions on land use	Y
		Proprietary controls	Deed restrictions, covenants, orders, easement	Y
		Information devices	Deed notices, public information programs, mapping/cataloging	Y
	In situ treatment	Passivation	Apatite, phosphates	Y
		Stabilization	pHoam™, alkaline agents, phosphates	Y
		Solidification	Cement, lime, pozzolans, fly ash	Y
	Containment	Capping	Clay, asphalt, concrete, geomembrane	Y
		Covers	Soil, drainage mats, geotextiles, riprap, evapotranspiration covers	Y
		Grading/erosion control	Slope reduction, benching, channeling	Y
		Revegetation	Evapotranspiration, sediment armoring, erosion control, phytoremediation	Y
	Mine Waste Removal/Disposal	Consolidation, on-site disposal	Engineered repository, Pit infill	N
		Consolidation, off-site disposal	Hazardous waste	N
			Nonhazardous waste	N
		Subterranean disposal	Mine tunnels/shafts	N
	Limited Mine Waste Removal/Disposal	Consolidation, on-site disposal	Engineered repository, Pit infill	Y
		Consolidation, off-site disposal	Hazardous waste	Y
			Nonhazardous waste	Y
	Reuse	Secondary mineral extraction	Recovery of saleable product	N
		Crushing/milling	Process for reuse on site as cover material	Y

Prototype Remedial Alternative



- ① SELECTIVELY REGRADE SLOPES. IDENTIFY AREAS FOR SOIL AMENDMENT AND REVEGETATION.
- ② SELECTIVE REGRADING, SOIL AMENDMENT, AND REVEGETATION. SURFACE AND SUBSURFACE DRAINAGE IMPROVEMENTS.
- ③ UPGRADE/REPLACE PUD AND EXPAND TO IMPROVE CAPTURE OF AD.
- ④ REMOVE ASB, CONVERT TO POND SIZED FOR SIX MONTHS OF SEEP COLLECTION. PUMP TO POND 1 (OR ALTERNATIVELY POND 4) FOR TREATMENT AT HDS TREATMENT PLANT ON A CAMPAIGN BASIS.
- ⑤ DOUBLE LINED ON-SITE SLUDGE REPOSITORY.
- ⑥ REROUTE STORMWATER FROM ACROSS TOP OF DELTA SLOPE TO LEVIATHAN CREEK AND COVER SLOPE WITH GEOTEXTILE OR BENTONITE TO DRY UP DELTA SEEP.
- ⑦ SELECTIVE USE OF CUTOFF WALLS/DRAINS TO REROUTE CLEAN WATER AND/OR COLLECT IMPACTED WATER.
- ⑧ DEEPEN AND/OR EXPAND ALL IMPOUNDMENTS TO INCREASE CAPACITY.
- ⑨ COMBINE FLOWS FROM ALL IMPOUNDMENTS FOR TREATMENT AT HDS PLANT.
- ⑩ OPERATE HDS TREATMENT PLANT AT FLOW-RATE AND FOR DURATION SUFFICIENT TO TREAT YEAR-ROUND VOLUME OF AD GENERATED.
- ⑪ SELECTIVE REMOVAL AND ARMORING OF IMPACTED SEDIMENTS.
- ⑫ CONVEY ASPEN SEEP FLOWS TO HDS PLANT FOR TREATMENT.

Note: Institutional Controls are Assumed